

NOTES ON MIGRATIONS OF THE PAINTED LADY  
BUTTERFLY IN 1941BY ANGUS M. WOODBURY, JOHN W. SUGDEN AND CLYDE GILLETTE  
*Salt Lake City, Utah*

Dispersal flights of the Painted Lady or Thistle Butterfly, *Vanessa cardui* (L.) passing northward through Utah have been reported by J. W. Sugden (Pan-Pac. Ent., 13:109-110) for the years 1924, 1930, 1931, and 1935. C. B. Williams (Ann. Ent. Soc. Amer., 31:219-223) summarized available knowledge of their movements up to 1938. Dr. Charles H. Abbot of the University of Redlands, California, reported (Bull. Ecol. Soc. Amer. 22:13) that a March-April, 1941, Painted Lady Butterfly migration in California "proved to be of smaller numbers and shorter duration than the more conspicuous migrations of 1924 and 1926." Extensive flights of these butterflies during April and May, 1941, in several western states, particularly Utah, Arizona, Colorado, Nevada, Idaho, California and New Mexico have either been observed by the writers or reported to them by other observers.

Professor Victor E. Jones of the University of Idaho at Pocatello reported that a student of his had first noted the Painted Ladies in northward movement on April 19. If so, they may have passed through Utah without being noted. Woodbury first noted these butterflies in upper Houserock Valley, Arizona, near the Utah line on April 26. On the next day, April 27, about ten A.M., he found them in northeastward flight about ten miles south of Escalante, Garfield County, Utah.

The butterflies were flying low, mostly between two and six feet above the ground, but occasionally higher or lower. They tended to hold a constant level above the surface, but obstacles or depressions seemed to require some adjustment. Upon approaching a ledge or rise in the ground, a butterfly would often fly almost into it before turning its course to avoid it. Upon approaching a depression such as a wash, one would tend to soar off into space a short distance before adjusting its course downward to find the ground that suddenly dropped away.

The general course of flight was about northeast roughly paralleling the foot of the Aquarius Plateau which rises to the north and west of the valley about three to four thousand feet. Butterflies were watched as they approached a south-facing ledge

about 20-30 feet high that partly barred the way. Many of the butterflies, upon reaching the ledge, turned eastward along its face until they found a way around or over it, when they immediately resumed the northeasterly direction.

They were also watched as they approached a deep wash draining easterly. It was about 100 feet wide at top, 20 feet deep and 30 feet wide at bottom. Coming over the edge, they dropped downward and usually reached bottom about at the foot of the north bank, where they turned and followed eastward along the bank some distance before ascending it and resuming the northeasterly direction.

The butterflies came mostly one or two at a time but occasionally were seen in threes, fours or even fives. There was a breeze from the northeast and they were heading directly into it. They appeared to fly almost constantly at a rate of about 20 miles per hour (measured by automobile speedometer when paralleling them in flight), but this seems to have been a little faster than visual estimates yielded in other places. The altitude ranged between five and six thousand feet and air temperatures were about 62° to 64° F.

Two sample counts were taken to get estimates of numbers. One on a 30-foot front yielded 192 butterflies in 15 minutes. The other on a 100-foot front yielded 200 butterflies in six minutes. When reduced to comparable figures they averaged about 38 butterflies per minute on a 100-foot front, or about 2000 per minute on a mile front.

Investigation indicated that they were moving forward on an area at least five miles wide, but how much wider was not determined. It was estimated that, during the five hours of observation, approximately 3,000,000 butterflies passed by on the five-mile front. How long the movement continued was not determined.

Even though a vast majority of the butterflies were on the move in the same direction, a few individuals were observed loitering along the way. A rain of the previous day had left puddles here and there which seemed to attract occasional individuals to stop at the puddle edges as if to drink. The loiterer behavior was usually distinguishable from that of the migrant.

After leaving Escalante about three P.M., no butterflies were seen at any place in Escalante Canyon nor at any place going down the canyon toward Widtsoe on the west side of the plateau.

Air temperatures were much lower than at Escalante. Watch was kept for butterflies from Widtsoe to Salt Lake City (250 miles) but none were seen. It was late in the afternoon and they might not have been flying if present.

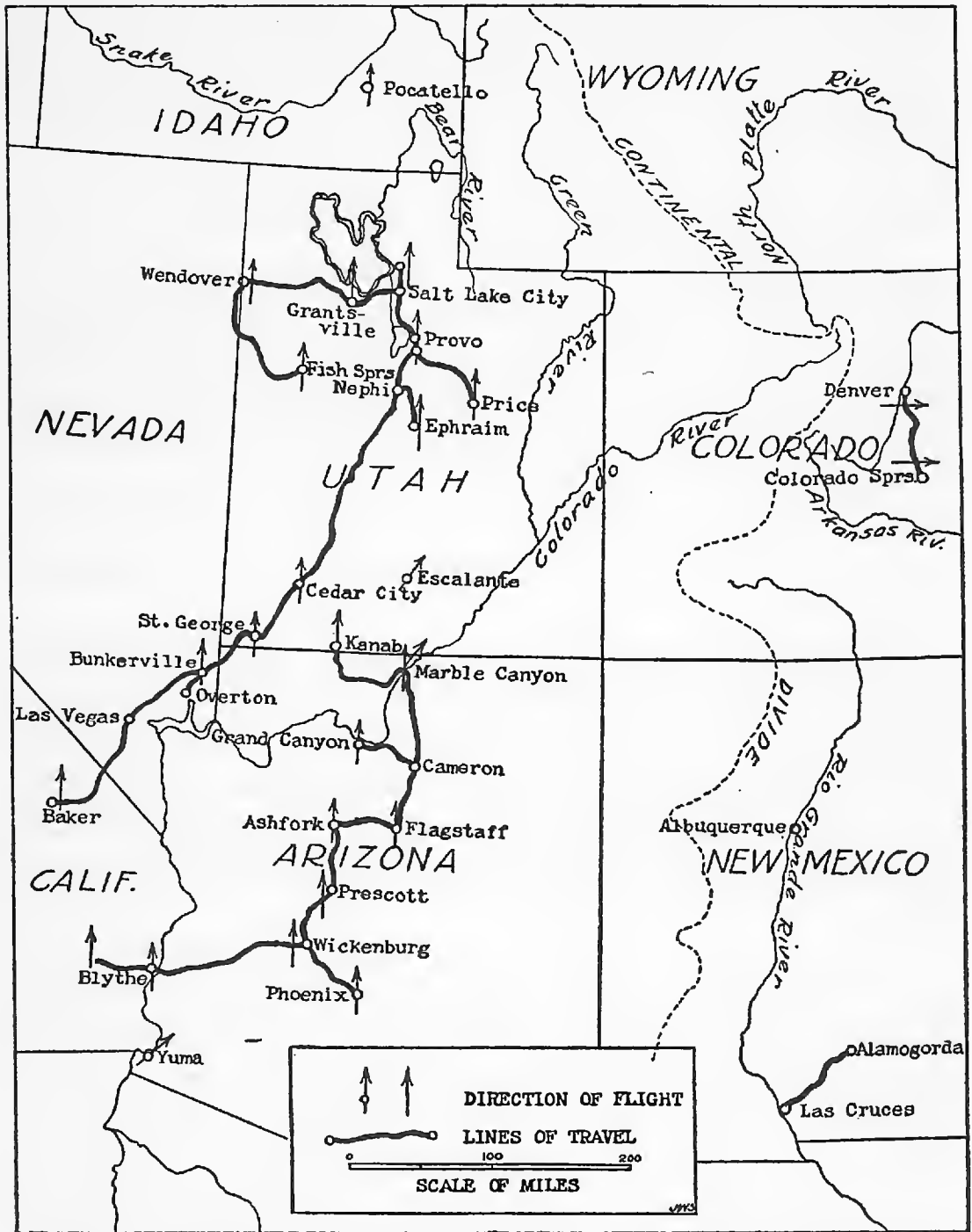


Fig. 1. Map showing observed emigrations of the Painted Lady Butterfly in the western states during 1941.

On the same date, April 27, 1941, Dr. V. M. Tanner (Great Basin Nat. 2:104) encountered large numbers of the Painted Lady Butterflies in northward migration between Kanarra, Iron County, and Anderson's Ranch, Washington County, Utah. From

Hurricane to St. George, many were seen flitting about but were not noted in emigrational flight.

The next day, April 28, Gillette left Salt Lake City for an extended trip through Utah, Arizona, California, and Nevada. Painted Lady Butterflies were first observed at Nephi, Juab County, about 90 miles to the south about ten A.M. when air temperatures were rapidly rising. They were as usual flying one or two at a time (sometimes more) close to the ground in a northerly direction turning only to avoid obstacles.

They were noted flying in the same general northerly direction while the observer was traveling southward all the way from Nephi to Cedar City, nearly 200 miles. They were especially numerous about 12-15 miles southwest of Kanosh, Millard County, where a stop was made to collect specimens and estimate numbers in movement. As a result of counting it was calculated on the average that 75 butterflies per minute crossed the road within a distance at which the butterflies would be visible. This agrees in a general way with the estimates made at Escalante the previous day.

At Cedar City, butterflies were observed from the evening of April 28 to the morning of April 30. They were in northward flight during the warm part of the day, but the flight appeared to cease in late afternoon and did not resume until mid-morning the next day. During the resting period, they were observed sitting on flowers (dandelions, etc.) or sipping water from stream edges.

On the morning of April 30, no butterflies were seen between Cedar City and Toquerville but it is almost certain that those passing through Cedar City on the previous day must have come that way (the route where they were observed by Tanner on April 27). Going eastward from Toquerville through Zion Canyon, none were seen until the canyon was passed, but they were picked up again on the plateau to the east and were observed all the way through Kanab, Utah and Fredonia, Arizona, to the Kaibab Forest.

Here the butterflies thinned out a great deal, but nevertheless a few were passing northward through the open coniferous forest (Ponderosa Pine) on the Kaibab Plateau, despite the fact that there was still some snow left among the trees. The butterflies were passing between the tree trunks near the ground as usual and not above the tops of the trees.



From the east foot of the Kaibab Plateau across Houserock Valley to Marble Canyon Bridge spanning the Colorado River and on to Cameron, butterflies were observed all the way, but they appeared to be most numerous at the river near Marble Canyon Bridge. Here was a peculiar condition. The butterflies were flying north, which course took them across the top of the narrow Marble Canyon Gorge. By looking with field glasses down into the gorge from the bridge, it was noted that many butterflies were flying up the gorge in a direction somewhat north of east.

The next day, May 1, a trip was taken from the south rim of Grand Canyon, down the Bright Angel Trail to the Colorado River in the bottom of the canyon. Butterflies were not noticed in the early morning, but by the time the river was reached, they were noted going northward down the steep slopes toward the river, as usual keeping close to the ground.

At the river, many of them were noted turning up stream as if following up the gorge. Returning to the south rim in the afternoon, the observer met many butterflies coming down the slopes.

On May 2, butterflies were noted nearly all the way from Grand Canyon southward through Cameron, Williams, Ashfork, Prescott, and Wickenburg to Phoenix, Arizona. The altitude dropped steadily from near 7000 feet at Flagstaff to near 1000 feet at Phoenix, but still the butterflies were moving in regular fashion. At Phoenix, on May 3, most of the butterflies looked fresh and bright colored and did not seem to be battered, worn or frayed on wing tips.

More butterflies were observed the next day, May 4, in traveling from Phoenix, Arizona, to the California border at Blythe near the Colorado River, but they tended to decrease in numbers westward toward the river and but few were noted between Blythe and Los Angeles on the coast.

During several days' stay in Los Angeles, no butterflies were observed in transit, and it was not until Baker, California, was reached on May 9, on the return journey to Salt Lake City that they were again encountered in northward flight. From Baker to Las Vegas, Nevada, they were observed in movement, but from there to Cedar City, Utah, darkness overtook the travelers and no butterflies were observed.

At Cedar City, May 10, Gillette found the Painted Lady Butterflies still numerous and many of them still following the regular northward route. In contrast with the Phoenix butterflies which seemed fresh and active, many of those at Cedar City on this date were frayed and worn and looked old and shabby. During late afternoon travel to Salt Lake City, the butterflies were noted during the first part of the journey, but as afternoon faded into evening, no more were observed.

On April 30, the day Gillette went from Cedar City to Grand Canyon, Tanner found the butterflies in northward movement over Mormon Mesa between Bunkerville and Overton, Clarke County, Nevada. During the next few days (May 1-3) he observed them around Lake Mead but not in dispersal flight.

On May 1, the date Gillette was in Grand Canyon, two of Woodbury's students (Harold Higgins and Robert Pendleton) left Salt Lake City for Price, Utah (120 miles) to spend the week-end. Northward moving butterflies were observed through Lehi, Provo and Springville to the mouth of Spanish Fork Canyon. Going up the canyon eastward through the mountains 30 miles to Soldier Summit, they found the butterflies scarce, although some were seen in the vicinity of Thistle that might have come down a tributary canyon from the south.

Beyond Soldier Summit (east of the mountains) in Colorado River drainage, the butterflies were again encountered, especially in the open country from there to the head of Price River Canyon. None were observed in the canyon itself, but at Price, beyond the mouth of the canyon, they were again numerous and were observed on successive days until May 4, when the boys returned to Salt Lake City.

On April 30 and May 1, the days Gillette was along the Colorado River, Sugden<sup>1</sup> observed them for the first time this year in Salt Lake City. They were not numerous but occasional individuals were seen. On May 2, Woodbury observed them in considerable numbers crossing the road which runs westward from Garfield to Grantsville, moving northward from Tooele Valley toward Great Salt Lake. They were noted at the same place on later trips over the same road on May 8, 9, and 10. By far the greater numbers were moving on May 8, and the numbers appeared to decrease on May 9 and 10. By May 13, when the next trip was taken, the flight seemed to have abated and only individuals indicating resident behavior were observed. An addi-

tional observation was made by Woodbury on May 5 when butterflies were observed moving northward along the east side of Great Salt Lake near the west foot of the Wasatch Mountains in the vicinity of Farmington.

Sugden also observed Painted Lady Butterflies in Salt Lake City every day from May 2 to 10. His notes indicate that they tended to increase slowly in numbers up to May 8 and then rapidly declined, which agrees closely with Woodbury's observations in Tooele Valley. He records that they were not too common on May 6, fairly common on May 7, more numerous on May 8, and not as numerous but with scattered butterflies about the city on May 10. When they were so numerous on May 8, he found them all the way east of the city up to the foot of the Wasatch Mountains, but did not find them in the narrow part of Parley's Canyon in the mountains. The flight here was typical of its flight elsewhere, most of them between two and ten feet above ground, flying generally northward, but varying somewhat northeast or northwest, or even east or west, but not directly south.

On May 9, Professor Jones personally observed them at Pocatello, Idaho, in northward flight. He commented that there were several *Vanessa carye*, West Coast Lady, mixed with *Vanessa cardui*. He also remarked that the weather had been so cold, blustery and stormy that it was doubtful if they could travel very far.

On May 11, Sugden made a trip from Salt Lake City westward through Grantsville to Wendover on the Utah-Nevada state line over U. S. highway 40, thence southward about 75 miles through Gold Hill to Fish Springs, Juab County, Utah, and northeastward back home to Salt Lake City. The butterflies were probably not flying when he passed through Grantsville (early morning) and he did not note any. Farther west and later in the morning, they were noted from time to time in northward movement until Wendover was reached, where they were still flying. An automobile which had presumably come from the west was observed to have many butterflies caught in the radiator, some fresh and others in various stages of drying, which led to the inference that butterfly movements were probably occurring somewhere in Nevada.

Butterflies were also noted in northward movement during the



trip southward to Fish Springs as well as on the return journey. It was noted, however, that at no place on the trip were moving butterflies very numerous when compared with the numbers observed in Salt Lake City on May 8. This region, however, borders the Great Salt Desert, an area of extreme drought and almost devoid of vegetation.

Additional data about the flight were obtained from Mr. H. W. Pickett who reported meeting a heavy flight between Santaquin, Utah County, and Nephi, Juab County, on May 5. They were especially numerous in the fields where "clouds" of butterflies passing across the road from one field to another so smeared his windshield that he had to have them scraped off. The next day, May 6, he encountered them again in San Pete Valley in the vicinity of Ephraim.

Further evidence of the widespread nature of the flight comes from a University of Utah field trip under the leadership of Wm. H. Behle and S. D. Durrant, on which butterflies were encountered on the Beaver Dam Wash in extreme southwestern Utah and northwestern Arizona on May 3, 4, 5, and 6. The butterflies were estimated to occur at intervals of 20 to 30 feet apart.

Additional evidence comes from Colorado. Victor F. Lotrich of the Colorado State Museum reports the following:

"On May 10 and 11, 1941, we noticed a migration of the painted lady along a front extending from Denver, Colorado, to Colorado Springs, Colorado. They were passing from the West in an easterly direction. The flight was against a stiff wind, and the butterflies flew low, seemingly in groups, although many individuals were noticed. On May 10th, the flight was continuous with the butterfly visible at all times. On May 11th the flight was scattering, but still was apparent along the front given above. In Colorado Springs a group of apple trees in bloom was watched. The painted lady stopped for a brief pause, seemingly to refresh itself, and then continued on its eastern journey."

"June 12, 1941, Nepesta, Colorado. We noticed the thistles and sunflowers, which due to much moisture were in profusion and growing rank in uncultivated areas. These plants had from one to several caterpillars each. It appeared to us that the migration of May 10 ended here, and that the painted lady flew to the extensive feeding found in the favorable soil provided by the wet climate of this spring. Further east along the Arkansas River the caterpillars were apparently absent."



Paul J. Klingenburg of the Soil Conservation Service located at Phoenix, Arizona, writes:

"My casual observation was that it was not abundant at Tucson or up the Santa Cruz Valley to the Mexican border. Dr. H. G. Johnston, Arizona State Extension Entomologist, tells me that the first occurrence of the migration was at Yuma with the direction of flight being generally northeast. Distribution was widespread in the Salt River Valley."

J. R. Eyer of State College, New Mexico, reported:

"I did observe large numbers of Painted Lady Butterflies, exceedingly abundant in the vicinity of Las Cruces, quite early in the spring, probably the latter part of April. These specimens for the most part were rather battered and rubbed, indicating either migration or that they had over-wintered here since last fall. They were feeding on early blooming members of the thistle family and on California Poppy. Owing to the fact that these were observed in the foothills of the Organ Mountains and on the desert between these mountains and Alamogordo, and due to the fact that they were feeding, I did not think of the flight as a particular migration, this species being rather abundant here each spring. However, the numbers were sufficiently large this spring to have accounted for such phenomena."

Prof. Wm. J. Koster of the University of New Mexico at Albuquerque noted during the last two weeks of May that butterflies were exceedingly numerous around the blooming rabbit-brush (*Chrysothamnus*) on the local "mesa" near the University.

This information appears to establish the Painted Lady Butterfly in northward dispersal flights in 1941 from March to mid-May on a front at least 800 miles wide, perhaps 1000, and traveling northward at least from Yuma, Arizona (near the Mexican border), to Pocatello, Idaho, about 700 miles. This need not necessarily imply that it was one continuous flight. It probably consisted of many parallel or tandem groups.

The evidence seems to indicate that the butterflies were more or less split by mountain chains although there is some indication that they do under some conditions pass over mountains or high plateaus. Gillette found them passing through the Kaibab Forest (8000 feet) in northern Arizona. Higgins and Pendleton found them on the high areas near Soldier Summit. Victor Lotrich found them going over a high mountain pass (Monarch

Pass, 11,386 feet) in Colorado on August 20, 1935, which he describes as follows:

"They were flying (westerly) in the general direction of Gunnison, Colorado. On the western slope, the butterfly was in countless numbers, and we watched them pass for two hours in a steady stream. The day was calm and balmy, the flight rapid, the butterfly visible from the ground to the tops of the trees. On the eastern slope the flight was slow going upwards toward the pass, and the butterfly was not grouped."

It seems possible that they may have come up from the south and have been squeezed between the main Rockies of the continental divide and the Sangre de Cristo Range where the two converge. It also seems possible that to get out of the funnel, they found an outlet over Monarch Pass into the Colorado Basin near Gunnison.

In some cases, they seem to have avoided deep canyons, especially those that cross their path, *e.g.*, Parley's Canyon (Sugden), Spanish Fork Canyon (Higgins and Pendleton) and Zion Canyon (Gillette). In other cases, deep canyons appear to be used as passageways, especially if the butterflies are not too much deflected from their course, *e.g.*, Marble Canyon (Gillette), washes and ledges near Escalante (Woodbury). Dry deserts, such as the flat wastes of the Great Salt Desert, do not block their passage and extensive water, such as Great Salt Lake, does not prevent their crossing as Sugden has observed them in other years not only on Antelope Island but also on Hat Island, far out in the lake.

The butterfly mode of travel seems to have a characteristic pattern, being more active during the warm parts of the day, slowing down in late afternoon and stopping altogether at night. This is probably conducive to inadequate observation since traveler is indistinguishable from loiterer except when in actual flight. The observations, *e.g.*, in New Mexico, of large numbers of loitering individuals do not prove dispersal flights; they merely indicate potential dispersal.

The origin and destination of the butterflies are not exactly clear from the evidence available but certain supplemental data give clues of some significance. On June 14, Woodbury noted that thistles on the north end of Antelope Island, Great Salt Lake, bore caterpillars of the Painted Lady Butterfly. On June 22,

Sugden found similar caterpillars on thistles at Murray and on the summit between Emigration and Parley's canyons, all within a few miles of Salt Lake City. Similarly Gillette found caterpillars on thistles in Salt Lake City and Woodbury found them still active on thistles high in Parley's Canyon on July 18. These observations are supplemented by those of Lotrich at Nepesta, Colorado, already reported.

It has been noted in all these observations, that nearly every thistle plant observed had been infested with the caterpillars. In contrast with tent caterpillars, which live in social groups (child families) and feed together on the same leaves (social territory), the Painted Lady caterpillars are solitary and have individual territories, each one usually consisting of a single spiny leaf, the edges of which are loosely rolled together and held in cylindrical form by silken threads. The caterpillar hides in this rolled leaf near the base (petiole) during the day and goes foraging over the leaf at night.

The number of caterpillars per plant varied considerably, ranging from one per plant to one per large leaf of the plant. The observations indicate that nearly every plant was quite thoroughly utilized, and barring interference by natural controls should produce a large crop of new butterflies. Presumably the eggs must have been laid as the adults passed by in their northward dispersal, which would provide a method by which widely dispersed host plants could be utilized on a grand scale.

Sugden noted near Murray on June 29 that many of the caterpillars were nearing maturity, some had left their rolled tubular leaves and one had reached the stage of pupation. On the same day, he noted that three caterpillars placed in a breeding cage on June 22 had pupated. Another caterpillar was successfully followed through pupation. It had, on the afternoon of July 1, attached itself by the posterior extremity. By next morning it had transformed into a pupa, very dark in color with yellow ventral spines. By July 3, the pupa had so faded that it was much lighter in color which continued until July 10, when the butterfly emerged. When liberated, it went directly to some nearby *Delphiniums* (Larkspur) where it continued feeding rapidly for a half hour before flying away.

The time required for larval development was not accurately determined, but may be estimated. Assuming that the first eggs



were laid in late April and the first pupation in late June, it then follows that under late spring and early summer temperatures, it takes about 60 days for egg and larval development and ten days for pupation. This would indicate at least 70 (possibly 90) days for the production of a new generation.

If these figures are accurate, they would seem to indicate a new midsummer generation in July or August. This raises two questions: What became of the parents who laid the eggs, and what is to become of the new generation? Since no records of southward return movements seem to have been recorded (as with the Monarch Butterfly), it seems reasonable to assume that the first generation of emigrants moving northward laid their eggs en route and finished their life cycle, after which they perished along the way.

If it is true that they do not make southward movements, then the new generation is destined to remain where they are or move northward in late summer as indicated, for example, by Lotrich's observation of movement over Monarch Pass on August 20, 1935.

Could it be possible that large areas of Arizona, New Mexico and Mexico act as reservoirs from which secular periodic outbreaks of large numbers of butterflies produce such population pressure that the northward movement takes place? If so, the reason for always taking the same direction (northward) is not clear. At any rate, it offers an outlet for some of the surplus population, where they find new host plants and raise new generations. Why the new generations do not persist in the new territory is also not clear, and appears to need further investigation.

The extent of the movements is so vast and the problems so great that the study of butterfly migration may need more intensive study than cursory and accidental observations can provide. Some responsible agency with adequate facilities should undertake more detailed investigations designed to establish the fundamental principles of such dispersal movements. This agency should be of national or international scope, such as the U. S. Fish and Wildlife Service, Division of Research, or the U. S. Bureau of Entomology. The person or persons assigned to the problem should have airplane and automobile facilities and permission to enter Mexico and Canada and should be free to follow the movements from origin to destination much as the duck flyways are now followed.